

REMARKS

Claims 18-34 are pending. Claims 18, 31 and 32 incorporate minor revisions. Claim 34 is similar to Claim 18 and is directed to a process performed in a fixed bed reactor. Descriptive support for such a process is found on page 9, first paragraph, of the specification. Accordingly, the Applicants do not believe that any new matter has been added.

Liquid Hourly Space Velocity ("LHSV")

The LHSV is the volumetric flow rate of a liquid based on the volume of the solid catalyst (specification, page 9, lines 5-8). LHSV is a limitation on the process steps and not a characteristic of the product produced.

Rejection – 35 U.S.C. § 102 or §103

Claims 10-17 were rejected under 35 U.S.C. § 102(b) as being anticipated, or in the alternative, under 35 U.S.C. 103(a) by Markert et al., DE 19520103 (Abstract). The Applicants traverse this rejection because the present claims are process claims and the cited prior art does not disclose or suggest the process step which requires a LHSV (liquid hourly space volume) of 0.3 to 3.0 hr<sup>-1</sup>. The LHSV is not a property or function of the product made by the claimed process, but a process step.

Response to ground of rejection under 35 U.S.C. 102(b). The rejection asserts that the LHSV is an inherent property or function. The Applicants disagree, since LHSV is a process step. Moreover,

“To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary

skill in the art”, Continental Can Co. USA v. Monsanto Co., 20 USPQ2d (Fed. Cir. 1991), MPEP 2131.01(III) (emphasis added)

The ground of rejection under 35 U.S.C. 102 does not make clear that the missing descriptive matter, i.e., the LHSV value, is necessarily present in the prior art process and provides no objective reasons for concluding that the prior art process “is carried out continuously under isothermal conditions at a temperature ranging from 45 to 60°C and under a hydrogen pressure of 1 to 300 bar at an LHSV (liquid hourly space velocity) of 0.3 to 3.0 hr<sup>-1</sup>.” Therefore, the Applicants request that this ground of rejection be withdrawn.

Response to ground of rejection under 35 U.S.C. 103. The rejection has not established that the prior art discloses all the elements of the invention, namely, a process which “is carried out continuously under isothermal conditions at a temperature ranging from 45 to 60°C and under a hydrogen pressure of 1 to 300 bar at an LHSV (liquid hourly space velocity) of 0.3 to 3.0 hr<sup>-1</sup>”, nor provided adequate reasoning why selection of these particular process steps would have been obvious to one with skill in the art. Thus, the Applicants submit that there is no *prima facie* basis for rejection of the present claims.

Moreover, the Applicants have shown that selection of this particular process step provides a superior process, because it avoids the reduction of the double bond of the unsaturated aldehyde, as discussed in more detail below.

Markert et al. disclose a process for the production of alkyl-substituted butenols. Although the basic reactions of Markert et al. are the same as the reactions of the present invention, the temperature condition in the reduction step (ii) is remarkably different between Markert et al. and the present invention. That is, the reduction temperature disclosed by Markert et al. is only 160°C in Example (Beispiel) 3 (see page 5, line 14 of Markert et al. and also page 3, lines 1-7 of the specification), while the reduction temperature is “40 to 60°C” in the present invention, see independent Claim 18.

In the reduction step (ii) of the process according to the present invention, only the aldehyde group of the unsaturated aldehyde is reduced while maintaining the double bond intact. If the double bond is also reduced in the reduction step (ii), a saturated product is formed as a by-product. The present invention selects the specific reduction conditions to avoid the reduction of the double bond of the unsaturated aldehyde. One such specific reduction conditions is the specific LHSV now indicated by Claim 18.

In Example 3 (reduction) of Markert et al, 40.0 kg of the crude product of aldol condensation was used per 2.8 kg of the Cu-Zn catalyst, while in Example 3 of the present application, 24.8 kg of the crude product of aldol condensation was used per 26 kg of the Cu/Zn catalyst. The present invention uses a much larger amount of the catalyst in relation to the amount of the crude product than Markert et al.

When the LHSV is set to “0.3 to 3.0 hr<sup>-1</sup>”, the reduction of the unsaturated aldehyde can be carried out at a relatively low temperature of 40 to 60°C and thus the aldehyde group is selectively reduced while the reduction of the double bond is prevented. The process of the present invention is carried out at a relatively low temperature of 45 to 60°C thus preventing over-reactions (or reductions) while the decrease in productivity caused by the low reaction temperature is prevented by carrying out the reaction continuously in a fixed bed reactor. On the other hand, the Markert process is carried out batch-wise (not continuously) at a temperature of 180°C and therefore would not achieve the superior results of the present invention.

Accordingly, the Applicants respectfully request that this ground of rejection be withdrawn, because Markert et al do not disclose or suggest that the reduction step (ii) be carried out at an LHSV of 0.3 to 3.0 hr<sup>-1</sup> and within the low temperature range of 40 to 60°C, nor does Markert provide any reasonable expectation of success for the superior properties of the present process, such as prevention of reduction of the double bond.

CONCLUSION

In view of the above amendments and remarks, the Applicants respectfully submit that this application is now in condition for allowance. Early notification to that effect is respectfully requested.

Respectfully submitted,

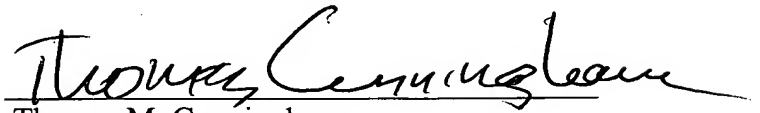
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A handwritten signature in black ink, appearing to read "Thomas M. Cunningham", written over a horizontal line.

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